

**INK JET RECORDER****Publication number:** JP10044471**Publication date:** 1998-02-17**Inventor:** KAGIYAMA MASATO**Applicant:** MATSUSHITA ELECTRIC IND CO LTD**Classification:**

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B41J2/165; B41J2/18; B41J2/185; B41J23/00; (IPC1-  
7): B41J2/18; B41J2/165; B41J2/185; B41J23/02

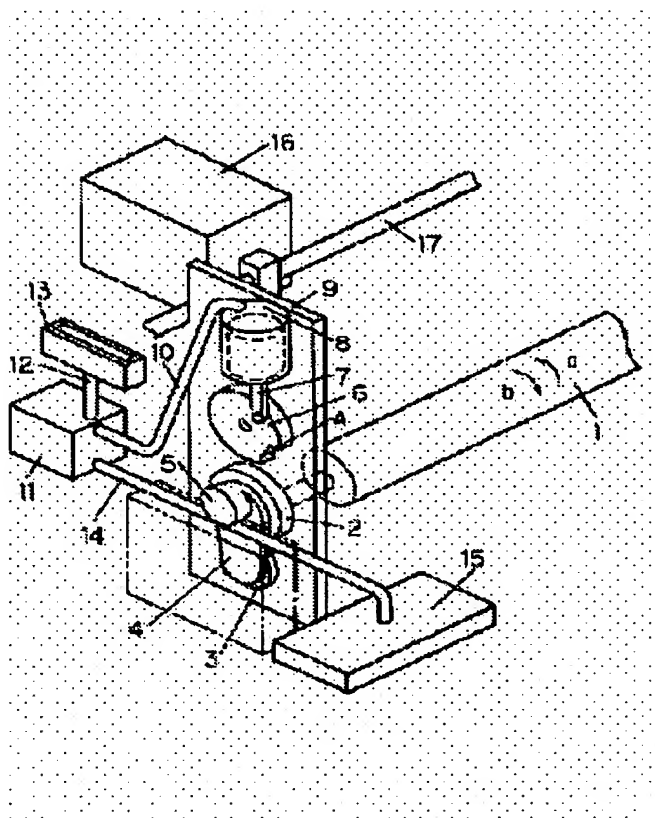
**- european:****Application number:** JP19960208139 19960807**Priority number(s):** JP19960208139 19960807

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**Abstract of JP10044471**

**PROBLEM TO BE SOLVED:** To obtain a unit for recovering an ink jet head clogged with ink which is applicable to oil ink without requiring any check valve or one way clutch.

**SOLUTION:** Driving force is transmitted from a drive source 1 such that an ink suction pump is engaged with a pump drive gear 6 to perform suction in response to the rotation of a paper feed roller (drive source) 1 in the first direction. Planetary gear mechanisms 2, 3 are disengaged from the pump drive gear 6 in response to the rotation of the drive source 1 in the second direction. The passage between an ink reservoir 11 and an ink discharge tank 15 is interrupted to enclose the ink sump 11 while being interlocked with the engagement of the planetary gear mechanisms 2, 3 and the pump drive gear 6. The passage between the ink reservoir 11 and the ink discharge tank 15 is then opened while being interlocked with the disengagement of the planetary gear mechanism and the pump drive gear 6 and the ink is fed from the ink sump to the discharge ink tank.



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CLAIMS

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[Claim(s)]

[Claim 1] A cap is made to stick to the front face of the ink jet head which should recover the normal regurgitation. In the ink jet head recording device which discharges the ink in said ink jet head by making the inside of said cap into negative pressure through an ink reservoir with a suction pump The epicyclic gear device in which engage with said suction pump according to rotation of the first direction of a driving source, deliver the driving force of said driving source that said suction pump performs suction actuation, and said engagement relation with said suction pump is canceled according to rotation of the second direction, Engagement to the suction pump of said epicyclic gear device is interlocked with with rotation of the first direction of said driving source, intercept the path of said ink reservoir and a \*\* ink tank, and said ink reservoir is changed into a sealing condition. The ink jet recording device which has a means for discharge engagement-related [ accompanying rotation of said second direction / said ] to be interlocked with, and to open said path.

[Claim 2] The piston of said suction pump is constituted so that suction actuation may be performed according to rotation of the first direction of the first gearing, and it follows on rotation of the first direction of said driving source. Said epicyclic gear device Engage with said first gearing, the first gearing is made to rotate in the first direction, and it follows on rotation of the second direction of said driving source. Said epicyclic gear device While solving said engagement on said first gearing, it engages with said first gearing again with rotation of the second further direction of said driving source. The ink jet recording device according to claim 1 characterized by being constituted so that the first gearing may be made to rotate in the second direction so that the piston of said suction pump may be driven to the suction direction and hard flow.

[Claim 3] Said first gearing has the notch without the gear tooth which solves substantial engagement in said epicyclic gear device, and said epicyclic gear device is minded. Transfer of the driving force of said driving source to said first gearing After performing predetermined suction actuation of said suction pump, it is constituted so that it may be interrupted by said notch. Transfer of the driving force of said driving source to said first gearing through said epicyclic gear device at the time of engagement on said epicyclic gear device and first gearing accompanying the further rotation of the second of said driving source The ink jet recording device according to claim 2 characterized by being constituted so that it may be interrupted by said notch after changing said suction pump into the original condition of not drawing in.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention has the description about an ink jet recording apparatus in the recovery device (International Patent Classification B41J 2/165) for realizing the ink regurgitation especially with a normal ink jet head.

[0002]

[Description of the Prior Art] Conventionally, in the ink jet recording apparatus, air was inhaled in the ink jet head by neglect and impulsive vibration source of long duration, and the recovery device for removing the defect ink in a \*\*\*\*\* case or a head for the poor regurgitation, and recovering the normal regurgitation has been needed.

[0003] For example, like drawing 3, if carriage 16 approaches the cap 13 in which disjunction is possible on an ink jet head, according to the device which is not illustrated, the outline of the recovery device of the indication to JP,2-78569,A will move cap 13, and will stick cap 13 on an ink jet head. Next, if the paper feed roller 1 is rotated in the direction of the arrow head b of the direction of paper feed, and hard flow, gearings 20 and 21 will drive through the one way clutch 19 which transmits the driving force of only the direction of arrow-head b. On the shaft 22, the gearing 21, the pump cam 23, and the location detection cam 26 have fixed. If the pump cam 23 drives, the pin 25 prepared in the end of the piston 9 of a suction pump 29 will make the cap 13 interior negative pressure by engaging with the cam groove 24 of the pump cam 23, and driving a piston 9, will discharge ink from the delivery of an ink jet head, and will accumulate it in a tank 29.

[0004] Furthermore, if the paper feed roller 1 is rotated in the direction of arrow-head b, the ink in a tank 29 will be discharged on the \*\* ink tank 15 by engaging with a cam groove 24 and driving a piston 9. Moreover, at this time, suction actuation of one stop will end rotation of a paper feed roller by setting a pilot switch 27 to ON, and the location detection cam 26 will be in an initial state.

[0005]

[Problem(s) to be Solved by the Invention] The means which carries out the detection check of the initial state of the recovery action by the location of the one way clutch which delivers only the driving force of hard flow the direction of paper feed, and a pump cam from a paper feed driving source is required of the above conventional configurations, and it is disadvantageous in respect of cost and a miniaturization. Moreover, in order to collect ink in a pump, when treating oily ink etc., an oilproof sealing material with expensive fluorine system rubber etc. must be used, and it is disadvantageous in respect of cost.

[0006] Moreover, after collecting ink in a pump, since the check valve is required in order to discharge ink on a \*\* ink tank, without making it flow backwards in the cap direction, structure is not only complicated, but becomes the cause hurt with the degradation.

[0007]

[Means for Solving the Problem] In order to solve said technical problem, the jet head recording device of this invention A cap is made to stick to the front face of the ink jet head which should recover the

normal regurgitation. In case the ink in said ink jet head is discharged by making the inside of said cap into negative pressure through an ink reservoir with a suction pump The epicyclic gear device in which engage with a suction pump according to rotation of the first direction of a driving source, transmit the driving force of said driving source, and said engagement relation with said suction pump is canceled according to rotation of the second direction, It is characterized by having a means for engagement to the suction pump of said epicyclic gear device to be interlocked with, and to intercept the path of said ink reservoir and a \*\* ink tank, to change said ink reservoir into a sealing condition, and for discharge engagement-related [ accompanying rotation of said second direction / said ] to be interlocked with, and to open said path.

[0008] Even when according to this invention not collecting ink in a pump and treating oily ink etc., it is not necessary to use an expensive oilproof sealing material, and is advantageous in respect of cost, and inside a pump, since the check valve is unnecessary, structure also becomes easy by opening and closing the path of an ink reservoir and a waste ink tank.

[0009]

[Embodiment of the Invention] Invention of this invention according to claim 1 makes a cap stick to the front face of the ink jet head which should recover the normal regurgitation. In the ink jet head recording device which discharges the ink in said ink jet head by making the inside of said cap into negative pressure through an ink reservoir with a suction pump The epicyclic gear device in which engage with said suction pump according to rotation of the first direction of a driving source, deliver the driving force of said driving source that said suction pump performs suction actuation, and said engagement relation with said suction pump is canceled according to rotation of the second direction, Engagement to the suction pump of said epicyclic gear device is interlocked with with rotation of the first direction of said driving source, intercept the path of said ink reservoir and a \*\* ink tank, and said ink reservoir is changed into a sealing condition. It is characterized by having a means for discharge engagement-related [ accompanying rotation of said second direction / said ] to be interlocked with, and to open said path. It is not necessary to use an oilproof sealing material expensive even when not collecting ink in a pump and treating oily ink etc., and are advantageous in respect of cost. Inside a pump, since the check valve is unnecessary, ink can be discharged by opening and closing the path of an ink reservoir and a waste ink tank from the inside of a head with the pump by easy structure.

[0010] The piston of said suction pump is constituted so that it may drive according to rotation of the first gearing, and invention according to claim 2 is followed on rotation of the first direction of said driving source. Said epicyclic gear device You make it rotate so that it may engage with said first gearing and the piston of a suction pump may drive in the suction direction, and it follows on rotation of the second direction of said driving source. Said epicyclic gear device While solving engagement on said first gearing, it engages with said first gearing with rotation of the second further direction of said driving source. It can be characterized by being constituted so that you may make it rotate so that the piston of said suction pump may be driven to the suction direction and hard flow, and a suction pump can be driven only by changing a hand of cut for a driving source.

[0011] Invention according to claim 3 on said first gearing It has the notch without the gear tooth which solves substantial engagement in said epicyclic gear device, and said epicyclic gear device is minded. Transfer of the driving force of said driving source to said first gearing After performing predetermined suction actuation of said suction pump, it is constituted so that it may be interrupted by said notch. Transfer of the driving force of said driving source to said first gearing through said epicyclic gear device at the time of engagement on said epicyclic gear device and first gearing accompanying the further rotation of the second of said driving source It is characterized by being constituted so that it may be interrupted by said notch after changing said suction pump into the original condition of not drawing in. A recovery device can be initialized only by changing a hand of cut for a driving source. While the drive to a recovery device is transmitted only by rotation of the first of a driving source by the gearing which has the notch which engages with an epicyclic gear device and becoming unnecessary [ an one way clutch ] The means which carries out the detection check of the initial state (a piston is in a bottom dead point) by transfer being interrupted by the notch of the gearing with which the drive from a driving

source has said notch becomes unnecessary, and it is advantageous in respect of cost and a miniaturization.

[0012] (Gestalt 1 of operation) An opinion is carried out to below about the gestalt of operation of this invention using drawing 1 and drawing 2. Drawing 1 is the perspective view showing the important section of the ink jet recording device of this invention, and the sun gear 2 from which 1 is a paper feed roller which rotates reversibly to the direction a of paper feed or the paper feed hard flow b, and constitutes an epicyclic gear device in the other end with the drive motor (not shown) combined with the end is being fixed. 3 engages with a sun gear 2 by the whirling arm 4 which is an epicyclic gear and is supported pivotable original with a same axle top to a sun gear 2, and an epicyclic gear 3 and a whirling arm 4 produce friction in the contact surface.

[0013] Moreover, the cam 5 which carried out eccentricity to the center of rotation of said sun gear 2 is formed in the whirling arm 4. 6 is the pump driver which has Notch A on a part of periphery, a pump consists of a piston 7 and a cylinder 8, the end of a piston 7 is combined with the pump driver 6 pivotable, and the cylinder 8 is being fixed to the base 9. 10 is an airstream way and connects the upper part and the cylinder 8 of the ink reservoir 11. 12 is ink passage and connects the upper part of the ink reservoir 11 with cap 13. 14 is the \*\* ink tube which consists of an elastic member, and it is constituted so that it may lead to the waste ink tank 15 which was formed in the location lower than the ink reservoir 11, and was wide opened by atmospheric air in the end through the base shown according to a two-dot chain line from the lower part of the ink reservoir 11, and the gap of a cam 5 established in the whirling arm 4. 16 is carriage, the ink jet head which is not illustrated is laid in the inferior surface of tongue of carriage 16, and is supported by the carriage rail 17 and driven to right and left among drawing with the carriage drive motor which is not illustrated.

[0014] The \*\* type Fig. of drawing 2 explains the recovery action of this invention below. However, since atmospheric-air disconnection of the \*\* ink tank was carried out in the end, the end of a \*\* ink tube was omitted as atmospheric-air disconnection. Drawing 2 (a) shows the condition that the carriage 16 in drawing 1 was moved to the cap 13 upper part, and the regurgitation side of the ink jet head 18 stuck with the cap 13. At this time, an epicyclic gear 3 is in the location d of sun-gear 2 directly under with the location c which gears to the notch of the pump driver 6, or a self-weight. Moreover, a piston is in a top dead center and atmospheric-air disconnection of the ink reservoir 11 is carried out through the \*\* ink tube 14.

[0015] Drawing 2 (b) shows the condition that a condition to the paper feed roller 1 and sun gear 2 of drawing 2 (a) carried out rotation initiation to the paper feed hard flow b with the signal of recovery action initiation. A whirling arm 4 makes a location e rotate an epicyclic gear 3 by friction between a whirling arm 4 and an epicyclic gear 3. At this time, an epicyclic gear 3 meshes with the pump driver 6, and starts transfer of driving force. Moreover, with rotation of a whirling arm 4, a cam 5 is made to press and transform the \*\* ink tube 14 into a substrate, makes the inside of the ink reservoir 11 a sealing condition, and a piston 7 moves toward a bottom dead point from a top dead center, and it begins to make the inside of the ink reservoir 11 negative pressure.

[0016] Drawing 2 (c) shows the condition that the paper feed roller 1 and a sun gear 2 continued rotating to the paper feed hard flow b further. As for the engagement position of rotation \*\*\*\*\* and the pump driver 6, an epicyclic gear 3 results in Notch A. At this time, the drive of an epicyclic gear 3 is not transmitted to the pump driver 6, but the pump driver 6 stops, a piston 7 reaches a bottom dead point and the ink from the ink jet head 18 collects on the ink reservoir 11.

[0017] As for drawing 2 (d), a condition to the paper feed roller 1 and sun gear 2 of drawing 2 (c) show the condition of having carried out rotation initiation in the direction a of paper feed. A whirling arm 4 makes a location c rotate an epicyclic gear 3 by friction between a whirling arm 4 and an epicyclic gear 3. At this time, an epicyclic gear 3 meshes with the pump driver 6, and starts transfer for a drive. Moreover, with rotation of a whirling arm 4, a cam 5 opens deformation of the \*\* ink tube 14 wide, and makes the inside of the ink reservoir 11 an atmospheric-air disconnection condition. At this time, the ink in the ink reservoir 11 is discharged from the ink reservoir 11 through the \*\* ink tube 14.

[0018] Drawing 2 (e) shows the condition that the paper feed roller 1 and a sun gear 2 continued rotating

in the direction a of paper feed. As for the engagement position of rotation \*\*\*\*\* and the pump driver 6, an epicyclic gear 3 results in Notch A. At this time, the drive of an epicyclic gear 3 is not transmitted to the pump driver 6, but the pump driver 6 stops, and a piston 7 reaches a top dead center and returns to an initial state. In addition, an original motor may be used although the driving source of a recovery device was used as the paper feed motor with the gestalt 1 of operation.

[0019]

[Effect of the Invention] Even when not collecting ink in a pump and treating oily ink etc., it is not necessary to use an expensive oilproof sealing material, and according to the ink jet recording device of this invention, it is advantageous in respect of cost, and since the check valve is unnecessary, structure is easy for the interior of a pump by opening and closing the path of an ink reservoir and a waste ink tank, and airtightness can offer the recovery device of a high ink jet head. moreover, the gearing which has the notch which engages with an epicyclic gear device -- if it uses, while the drive to a recovery device will be started by only rotation of the first of a driving source and becoming unnecessary [ a complicated clutch ] by it, it is that transfer is interrupted by the notch of the gearing with which the drive from a driving source has said notch, and the means which carries out the detection check of the initial state (a piston is in a bottom dead point) becomes unnecessary, and it is advantageous in respect of cost and a miniaturization

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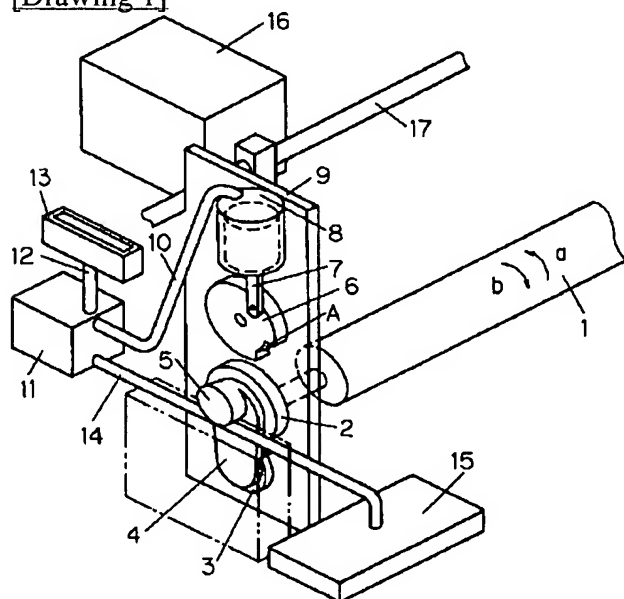
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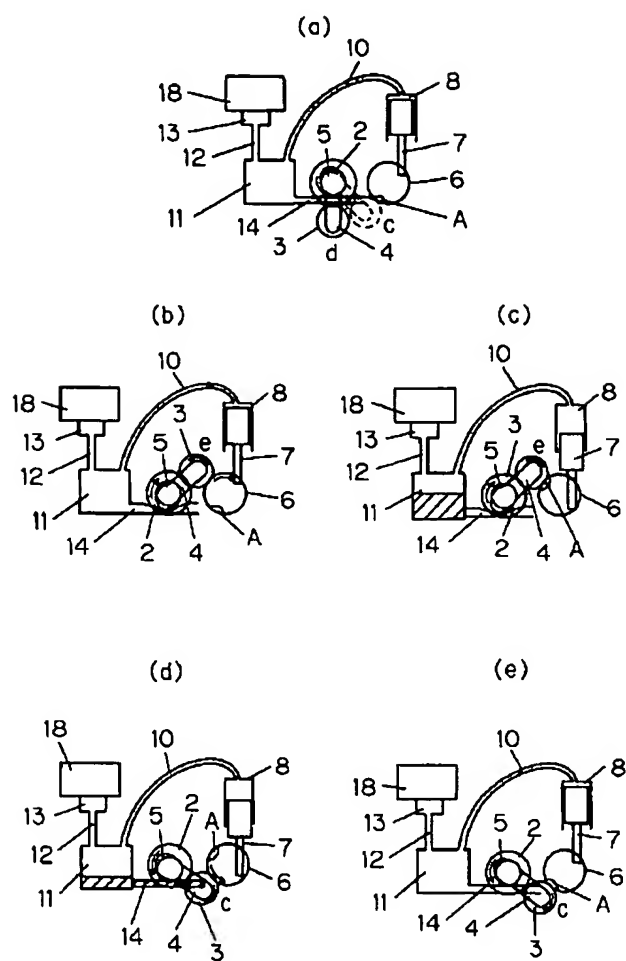
DRAWINGS

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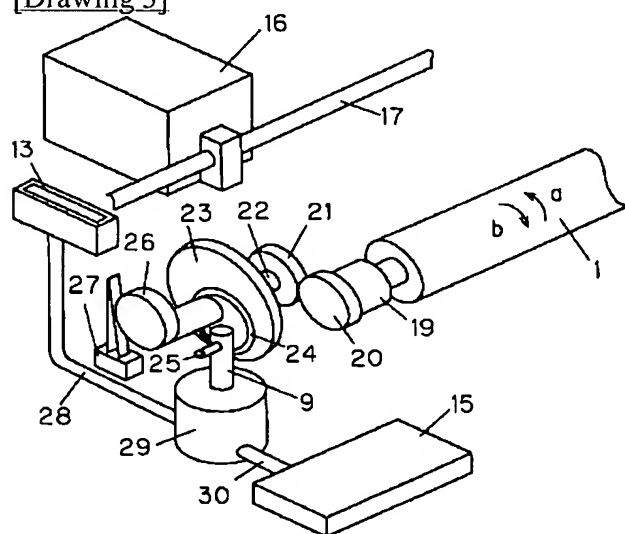
[Drawing 1]



[Drawing 2]



[Drawing 3]



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## 【特許請求の範囲】

【請求項 1】 正常な吐出を回復すべきインクジェットヘッドの前面にキャップを密着せしめ、吸引ポンプによりインク溜めを介して前記キャップ内を負圧にすることにより前記インクジェットヘッド内のインクを排出するインクジェットヘッド記録装置において、駆動源の第一の方向の回転に応じて前記吸引ポンプに係合して前記駆動源の駆動力を前記吸引ポンプが吸引動作を行うように伝達し、第二の方向の回転に応じて前記吸引ポンプとの前記係合関係を解除する遊星歯車機構と、前記駆動源の第一の方向の回転に伴って前記遊星歯車機構の吸引ポンプとの係合に連動して前記インク溜めと排インクタンクとの通路を遮断して前記インク溜めを密閉状態にし、前記第二の方向の回転に伴う前記係合関係の解除に連動して前記通路を開放する手段を有するインクジェット記録装置。

【請求項 2】 前記吸引ポンプのピストンは第一の歯車の第一の方向の回転に応じて吸引動作を行うように構成されており、前記駆動源の第一の方向の回転に伴って前記遊星歯車機構は、前記第一の歯車に係合して、その第一の歯車を第一の方向に回転せしめ、前記駆動源の第二の方向の回転に伴って前記遊星歯車機構は、前記第一の歯車との前記係合を解くとともに、前記駆動源のさらなる第二の方向の回転に伴って前記第一の歯車に再度係合して、前記吸引ポンプのピストンを吸引方向と逆方向に駆動するように第一の歯車を第二の方向に回転せしめるよう構成されていることを特徴とする請求項 1 に記載のインクジェット記録装置。

【請求項 3】 前記第一の歯車は、前記遊星歯車機構との実質的な係合を解く歯のない切欠部を有しており、前記遊星歯車機構を介して前記第一の歯車への前記駆動源の駆動力の伝達は、前記吸引ポンプの所定吸引動作を行った後に、前記切欠部により中断されるように構成されており、前記駆動源のさらなる第二の回転に伴っての前記遊星歯車機構と第一の歯車との係合時における、前記遊星歯車機構を介しての前記第一の歯車への前記駆動源の駆動力の伝達は、前記吸引ポンプを元の非吸引状態にした後に、前記切欠部により中断されるように構成されていることを特徴とする請求項 2 に記載のインクジェット記録装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、インクジェット記録装置に関するもので、特にインクジェットヘッドの正常なインク吐出を実現させるための回復機構（国際特許分類 B 4 1 J 2 / 1 6 5）に特徴を有するものである。

## 【0002】

【従来の技術】 従来より、インクジェット記録装置では長時間の放置や衝撃振動によりインクジェットヘッド内

に空気を吸い込み、吐出不良を発生した場合やヘッド内の不良インクを除去し正常な吐出を回復するための回復機構が必要とされてきた。

【0003】 例えば特開平 2 - 7 8 5 6 9 号公報に開示の回復機構の概略は図 3 のように、インクジェットヘッドに離接可能なキャップ 1 3 にキャリッジ 1 6 が近接すると、図示されない機構により、キャップ 1 3 を移動して、インクジェットヘッドにキャップ 1 3 を密着させる。次に、紙送りローラ 1 を紙送り方向と逆方向の矢印 b の方向に回転させると、矢印 b 方向だけの駆動力を伝達する一方向クラッチ 1 9 を介して歯車 2 0、2 1 が駆動される。軸 2 2 には歯車 2 1 とポンプカム 2 3 と位置検出力カム 2 6 が固着されている。ポンプカム 2 3 が駆動されると、吸引ポンプ 2 9 のピストン 9 の一端に設けられたピン 2 5 は、ポンプカム 2 3 のカム溝 2 4 に係合しピストン 9 を駆動することでキャップ 1 3 内部を負圧とし、インクジェットヘッドの吐出口からインクを排出しタンク 2 9 に溜める。

【0004】 さらに、紙送りローラ 1 を矢印 b 方向に回転させると、カム溝 2 4 に係合しピストン 9 を駆動することでタンク 2 9 内のインクを排インクタンク 1 5 に排出する。また、このとき位置検出力カム 2 6 は検出スイッチ 2 7 をオンとして紙送りローラの回転を止め 1 回の吸引動作が終了し、初期状態となる。

## 【0005】

【発明が解決しようとする課題】 以上のような従来の構成では、紙送り駆動源から紙送り方向とは逆方向の駆動力のみを伝達する一方向クラッチとポンプカムの位置による回復動作の初期状態を検知確認する手段が必要であり、コスト面と小型化の面で不利である。また、ポンプ内にインクを溜めるため油性インク等を扱う場合はフッ素系ゴム等の高価な耐油性のシール材料を使用せねばならずコスト面で不利である。

【0006】 また、ポンプ内にインクを溜めた後、キャップ方向に逆流させずに排インクタンクにインクを排出するためには逆止弁が必要であるため構造が複雑だけでなく、その劣化とともに気密性を損なう原因となる。

## 【0007】

【課題を解決するための手段】 前記課題を解決するために、本発明のジェットヘッド記録装置は、正常な吐出を回復すべきインクジェットヘッドの前面にキャップを密着せしめ、吸引ポンプによりインク溜めを介して前記キャップ内を負圧にすることにより前記インクジェットヘッド内のインクを排出する際に、駆動源の第一の方向の回転に応じて吸引ポンプに係合して前記駆動源の駆動力を伝達し、第二の方向の回転に応じて前記吸引ポンプとの前記係合関係を解除する遊星歯車機構と、前記遊星歯車機構の吸引ポンプとの係合に連動して前記インク溜めと排インクタンクとの通路を遮断して前記インク溜めを密閉状態にし、前記第二の方向の回転に伴う前記係合関

係の解除に連動して前記通路を開放する手段を有することを特徴としたものである。

【0008】本発明によればポンプ内にインクを溜めることがなく、油性インク等を扱う場合でも高価な耐油性のシール材料を使用する必要がなくコスト面で有利であり、インク溜めと廃インクタンクの通路を開閉することでポンプ内部に逆止弁が不要であるため構造も簡単になる。

【0009】

【発明の実施の形態】本発明の請求項1に記載の発明は、正常な吐出を回復すべきインクジェットヘッドの前面にキャップを密着せしめ、吸引ポンプによりインク溜めを介して前記キャップ内を負圧にすることにより前記インクジェットヘッド内のインクを排出するインクジェットヘッド記録装置において、駆動源の第一の方向の回転に応じて前記吸引ポンプに係合して前記駆動源の駆動力を前記吸引ポンプが吸引動作を行うように伝達し、第二の方向の回転に応じて前記吸引ポンプとの前記係合関係を解除する遊星歯車機構と、前記駆動源の第一の方向の回転に伴って前記遊星歯車機構の吸引ポンプとの係合に連動して前記インク溜めと排インクタンクとの通路を遮断して前記インク溜めを密閉状態にし、前記第二の方向の回転に伴う前記係合関係の解除に連動して前記通路を開放する手段を有することを特徴としたものであり、ポンプ内にインクを溜めることがなく、油性インク等を扱う場合でも高価な耐油性のシール材料を使用する必要がなくコスト面で有利であり、インク溜めと廃インクタンクの通路を開閉することでポンプ内部に逆止弁が不要であるため、簡単な構造によるポンプによりヘッド内からインクを排出することができる。

【0010】請求項2に記載の発明は、前記吸引ポンプのピストンは第一の歯車の回転に応じて駆動されるように構成されており、前記駆動源の第一の方向の回転に伴って前記遊星歯車機構は、前記第一の歯車に係合して吸引ポンプのピストンが吸引方向に駆動されるように回転せしめ、前記駆動源の第二の方向の回転に伴って前記遊星歯車機構は、前記第一の歯車との係合を解くとともに、前記駆動源のさらなる第二の方向の回転に伴って前記第一の歯車に係合して、前記吸引ポンプのピストンを吸引方向と逆方向に駆動するように回転せしめるよう構成されていることを特徴としたものであり、駆動源を回転方向を切り替えるだけで吸引ポンプを駆動することができる。

【0011】請求項3に記載の発明は、前記第一の歯車には、前記遊星歯車機構との実質的な係合を解く歯のない切欠部を有しており、前記遊星歯車機構を介して前記第一の歯車への前記駆動源の駆動力の伝達は、前記吸引ポンプの所定吸引動作を行った後に、前記切欠部により中断されるように構成されており、前記駆動源のさらなる第二の回転に伴っての前記遊星歯車機構と第一の歯車

との係合時における、前記遊星歯車機構を介しての前記第一の歯車への前記駆動源の駆動力の伝達は、前記吸引ポンプを元の非吸引状態にした後に、前記切欠部により中断されるように構成されていることを特徴としたものであり、駆動源を回転方向を切り替えるだけで回復機構を初期化することができ、遊星歯車機構と係合する切欠部を有する歯車により駆動源の第一の回転によってのみ回復機構への駆動が伝達され一方クラッチは不要となるとともに、駆動源からの駆動が前記切欠部を有する歯車の切欠部により伝達が中断されることで初期状態（ピストンが下死点にある）を検知確認する手段が不要となり、コスト面と小型化の面で有利である。

【0012】（実施の形態1）以下に、本発明の実施の形態について、図1、図2を用いて説する。図1は本発明のインクジェット記録装置の要部を示す斜視図であり、1は一端に結合された駆動モータ（図示せず）により、可逆的に紙送り方向aもしくは紙送り逆方向bに回転される紙送りローラであり、その他端には、遊星歯車機構を構成する太陽歯車2が固定されている。3は遊星歯車で、太陽歯車2に対して同軸上独自に回転可能に支持される回転腕4により太陽歯車2と係合し、遊星歯車3と回転腕4はその接触面にて摩擦を生ずる。

【0013】また、回転腕4には前記太陽歯車2の回転中心に対して偏心したカム5が形成されている。6は外周の一部に切欠部Aを有するポンプ駆動歯車で、ポンプはピストン7とシリンダ8から成り、ピストン7の一端はポンプ駆動歯車6に回転可能に結合されており、シリンダ8は基部9に固定されている。10は空気流路で、インク溜め11の上部とシリンダ8を連結する。12はインク流路で、キャップ13とインク溜め11の上部を連結する。14は弾性部材から成る排インクチューブで、インク溜め11の下部から2点鎖線で示す基部と回転腕4に設けられたカム5の間隙を通じて、インク溜め11よりも低い位置に設けられ一端を大気開放された廃インクタンク15に通じるよう構成されている。16はキャリッジで、キャリッジ16の下面には図示されないインクジェットヘッドが載置されており、キャリッジレール17に支持され、図示されないキャリッジ駆動モータにより図中左右に駆動される。

【0014】つぎに図2の模式図により本発明の回復動作について説明する。ただし排インクタンクは一端を大気開放されているので、排インクチューブの一端を大気開放として省略した。図2(a)は、図1中キャリッジ16がキャップ13上方に移動されインクジェットヘッド18の吐出面がキャップ13と密着した状態を示す。このとき、遊星歯車3はポンプ駆動歯車6の切欠部に噛み合う位置cもしくは自重により太陽歯車2直下の位置dにある。またピストンは上死点にあり、インク溜め11は排インクチューブ14を通じ大気開放されている。

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【0015】図2(b)は回復動作開始の信号により図2(a)の状態から紙送りローラ1と太陽歯車2が紙送り逆方向bに回転開始した状態を示す。回転腕4は、回転腕4と遊星歯車3の間の摩擦により遊星歯車3を位置eに回転させる。このとき遊星歯車3はポンプ駆動歯車6に噛み合い駆動力の伝達を開始する。また回転腕4の回転に伴いカム5は排インクチューブ14を基板に押圧して変形せしめインク溜め11内を密閉状態とし、ピストン7が上死点から下死点に向かい移動してインク溜め11内を負圧にしはじめる。

【0016】図2(c)は、さらに紙送りローラ1と太陽歯車2が紙送り逆方向bに回転し続けた状態を示す。遊星歯車3が回転続けるとポンプ駆動歯車6との噛み合い位置は切欠部Aに至る。このとき、遊星歯車3の駆動はポンプ駆動歯車6に伝達されずポンプ駆動歯車6は停止しピストン7は下死点に至り、インク溜め11にはインクジェットヘッド18からのインクが溜まる。

【0017】図2(d)は、図2(c)の状態から紙送りローラ1と太陽歯車2が紙送り方向aに回転開始した状態を示す。回転腕4は、回転腕4と遊星歯車3の間の摩擦により遊星歯車3を位置cに回転させる。このとき遊星歯車3はポンプ駆動歯車6に噛み合い駆動を伝達を開始する。また回転腕4の回転に伴いカム5は、排インクチューブ14の変形を開放しインク溜め11内を大気開放状態とする。このとき、インク溜め11内のインクは排インクチューブ14を介してインク溜め11から排出される。

【0018】図2(e)は紙送りローラ1と太陽歯車2が紙送り方向aに回転し続けた状態を示す。遊星歯車3が回転続けるとポンプ駆動歯車6との噛み合い位置は切欠部Aに至る。このとき、遊星歯車3の駆動はポンプ駆動歯車6に伝達されずポンプ駆動歯車6は停止しピストン7は上死点に至り、初期状態に戻る。なお、実施の形態1では回復機構の駆動源を紙送りモータとしたが独自のモータでもよい。

【0019】

【発明の効果】本発明のインクジェット記録装置によれば、ポンプ内にインクを溜めることがなく、油性インク等を扱う場合でも高価な耐油性のシール材料を使用する必要がなくコスト面で有利であり、インク溜めと廃インクタンクの通路を開閉することでポンプ内部に逆止弁が不要であるため構造が簡単で気密性が高いインクジェットヘッドの回復装置を提供できる。また、遊星歯車機構と係合する切欠部を有する歯車お用いれば、駆動源の第一の回転によってのみ回復機構への駆動が開始され複雑なクラッチは不要となるとともに、駆動源からの駆動が前記切欠部を有する歯車の切欠部により伝達が中断されることで、初期状態(ピストンが下死点にある)を検知確認する手段が不要となりコスト面と小型化の面で有利である。

【図面の簡単な説明】

【図1】本発明の実施の形態におけるインクジェット記録装置の要部斜視図

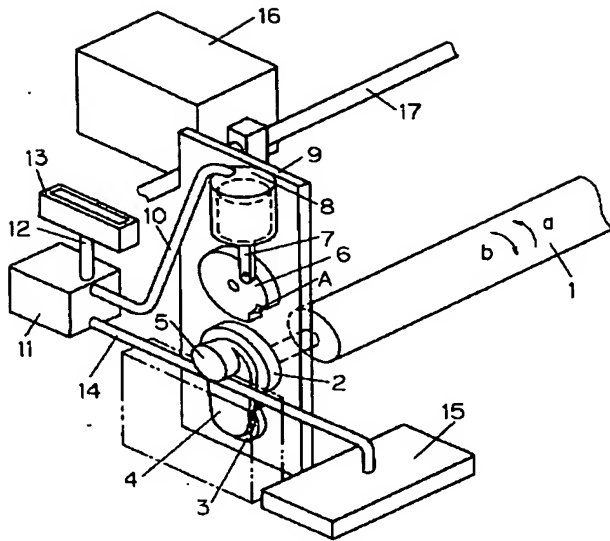
【図2】本発明の実施の形態における異なる動作状態を示す模式図

【図3】従来のインクジェット記録装置の要部斜視図

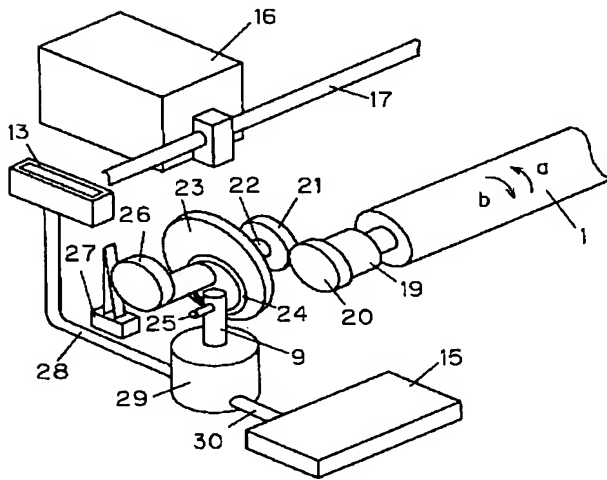
【符号の説明】

- 1 紙送りローラ
- 2 太陽歯車
- 3 遊星歯車
- 4 回転腕
- 5 カム
- 6 ポンプ歯車
- 7 ピストン
- 8 シリンダ
- 11 インク溜り
- 13 キャップ
- 14 排インクチューブ
- 15 排インクタンク

【図 1】



【図 3】



【図 2】

